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Ms. Magalie Roman Salas  
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Federal Communications Commission  
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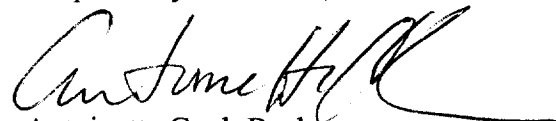
Re: Ex Parte Presentation in Revision of the Commission's  
Rules to Ensure Compatibility with Enhanced 911  
Emergency Calling Systems, CC Docket No. 94-102

Dear Ms. Salas:

On Monday, May 24, 1999, Michael Amarosa and Lou Stilp of TruePosition, Inc., Jay Birnbaum of this firm and I met with James Schlichting, Daniel Grosh, Nancy Boocker and Julie Buchanan of the Wireless Telecommunications Bureau. TruePosition's representatives set forth the safety, technological, legal and business reasons why the Bureau should reaffirm the Phase II implementation deadline.

Pursuant to 47 C.F.R. § 1.1206, two copies of this letter and the attached materials, which were distributed during the meeting, are being submitted.

Respectfully submitted,



Antoinette Cook Bush  
Counsel for TruePosition, Inc.

cc: (w/o attachments)  
James Schlichting  
Daniel Grosh  
Nancy Boocker  
Julie Buchanan

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Presentation of TruePosition, Inc.  
to the Wireless Telecommunications Bureau of the FCC

May 24, 1999



## SUMMARY

- The *Prompt* Reaffirmation of the Phase II Implementation Date and Denial of the Pending Waiver Requests Are Required by the Record and in the Public Interest
- TruePosition Has Successfully Deployed Its Wireless E911 Location System
- TruePosition's System Performance Will Continue to Improve
- Unattributed Press Reports that TruePosition's GHC System Had Problems Locating Phones at the Edges of Cell Sites are False
- The Premise Underlying the Pending Waiver Requests is Flawed: GPS-Based Solutions Do Not Work and Are Still At Least Several Years Away
  - Flaws in SnapTrack's Tampa Testing Include:
    - No actual telephone calls were made. The EGPS unit was continuously connected to SnapTrack's server.
    - The unit was not successful in all location attempts.
    - The time to locate the test unit was unacceptably high.
- Handset-Based Solutions are *Not* Less Expensive Than Network Solutions

**The *Prompt* Reaffirmation of the Phase II Implementation Date and Denial of the Pending Waiver Requests Are Required by the Record and in the Public Interest**

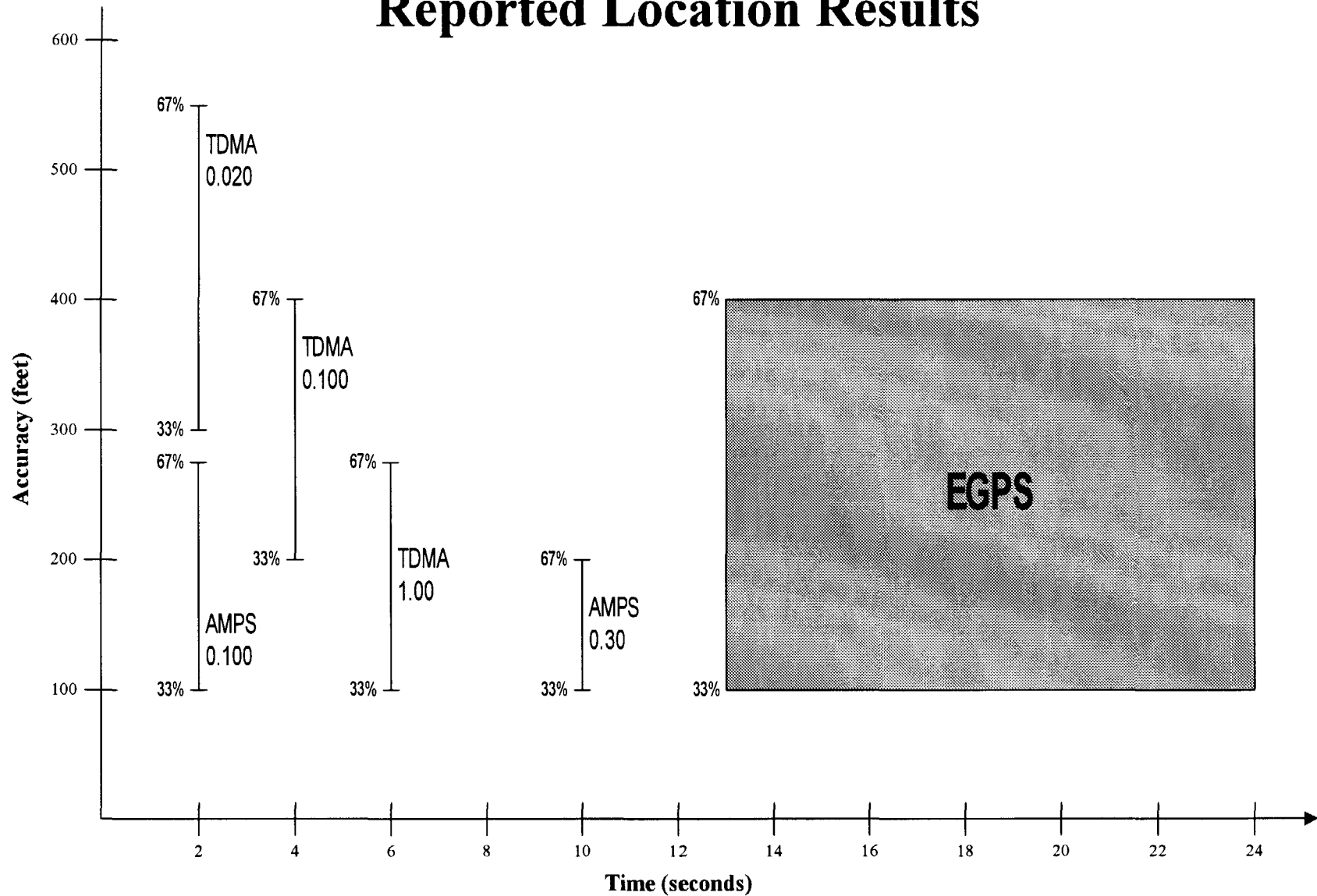
- Better than 1 out of every 2 CMRS users will dial 9-1-1 from their wireless phones this year, and the rate is increasing.
  - PSAPs need E911 data to manage CMRS 9-1-1 call growth; they cannot wait several years more.
- FCC rules are designed to get each 9-1-1 call to the right call taker on the first try.
  - All 9-1-1 calls from all CMRS phones must be covered.
  - Location detection must be performed before call routing takes place (2-4 seconds).
  - User information (call-back number and initial location) must be provided to PSAP.
- Location updates where necessary.
- Reaffirmation of the existing rules will save lives.
  - Chairman Kennard has emphasized that carriers should "beat, not just meet," the deadline.

### **TruePosition Has Successfully Deployed Its Wireless E911 Location System**

- TruePosition has successfully deployed its E911 Wireless Location System in Greater Harris County ("GHC"), Texas in cooperation with the GHC 9-1-1 Emergency Network, confirming that TruePosition's system works in real-world CMRS environments.
- TruePosition's GHC system has exceeded the FCC's accuracy requirement (125 meters for *all* calls using RMS methodology). The system
  - located greater than 67% of the calls within 85 meters (280 feet).
  - located greater than 60% of the calls within 61 meters (200 feet).
  - located greater than 36% of the calls within 30 meters (100 feet).
  - located greater than 22% of the calls within 15 meters (50 feet).
  - located *every one* of more than one million calls placed since early February 1999, including calls made in all types of weather conditions and from various locations: indoors, urban canyons, heavy foliage, and in stationary automobiles and those traveling on highways.
- Planned enhancements, such as continuous voice channel tracking, will further improve accuracy to as low as 40 meters or less for 67% of all calls.
- TruePosition continues to locate more than 10,000 test calls daily to maintain the system's readiness and to continue improving its accuracy capabilities.
- TruePosition's GHC system is now ready for immediate cut-over to live 9-1-1 calls, subject only to the wireless carrier's readiness to route 9-1-1 calls directly to the appropriate PSAP.
- The TruePosition system can locate *ALL* 55 million existing AMPS phones in the U.S. today, whether they are roaming or in their "home" markets. This comprises almost 80% of the nearly 70 million wireless phones now in use, 12 million of which were purchased in 1998.

- TruePosition is ready immediately to install TDMA location equipment; CDMA equipment will be available later this year.
- Unlike recent trials of handset-based technologies, the TruePosition system requires no prototype, specially constructed, or modified CMRS phones; Americans do not have to spend \$20 billion on replacement phones.

# Comparison of TruePosition and SnapTrack Reported Location Results



### **TruePosition's System Performance Will Continue to Improve**

- Today, TruePosition reports location only once per call. With voice channel tracking, TruePosition can calculate location several times over the first minute of a wireless 9-1-1 call. When several location estimates are averaged together, the resulting "average location" will be more accurate than any one single estimate. TruePosition could provide location updates to PSAPs as often as every few seconds.
- Monitoring of voice channel signals will allow TruePosition to use signals much longer in length (perhaps 1 to 2 seconds), which will improve location accuracy.
- One vendor has committed enhanced CMR network capabilities to enable the CMRS network to increase the phone power for several seconds to provide a better quality signal on which to calculate location. This too will improve location accuracy.
- For certain air interfaces TruePosition will gain access to new information from the base station (ranging data, for example). This information, combined with the measurements made independently by TruePosition's system, will also improve location accuracy.



**Unattributed Press Reports that TruePosition's GHC System  
Had Problems Locating Phones at the Edges of Cell Sites are False**

- TruePosition's contract with GHC called for the installation of the system in several stages, beginning with the location of AMPS telephones in one of the densest areas of Houston, covering 70 Houston Cellular cell sites over 150 square miles, including portions of downtown Houston. On March 30, 1999, GHC formally accepted the initial phase of the TruePosition system.
- Subsequent stages call for enhancement of the system to locate TDMA and CDMA phones, and then expansion into the remaining areas of Harris and Fort Bend Counties. Expansion of the system under the GHC contract will extend same location accuracy to the outskirts of the cellular system. Further, to improve location detection TruePosition can locate its facilities beyond the cellular system boundaries by placing them on buildings and other structures.
- The dispute between Houston Cellular Telephone Company and the GHC Network is not about the performance of TruePosition's location system.

**The Commission Has Repeatedly Emphasized That  
Firm Adherence to the E911 Deadline Serves the Public Interest**

- "Considering the importance of providing location information during emergencies and the passage of time since the establishment of PCS and the initiation of the E911 proceeding, we determine that the 5-year implementation schedule should not be delayed any longer and we urge the PCS industry and other wireless digital system providers to continue their efforts to comply with the rules . . . [P]roviders had sufficient notice to prepare for the implementation of the E911 features since 1993, and it is not necessary to delay the October 1, 2001 implementation schedule at this time." E911 MO&O at ¶121.
- "[W]e believe that setting a firm date will encourage entrepreneurial efforts and investment to serve this market." E911 MO&O at ¶ 120.
- "[W]hat we're doing today literally is a matter of life and death for a lot of people . . . . It's no exaggeration at all. The ability of people to rely on these phones for emergency use is so vitally important. I was reading a statistic just yesterday that every day in America, 98,000 people use a wireless phone to call 911. That's 36 million calls per year. So Americans are increasingly relying on their wireless phones for public safety, and we've got to do everything we can to ensure that the public has the confidence in these phones that these calls are going to go through. . . . So increasingly this technology is saving lives and we've got to do everything we can to make that happen more and more often. . . . [W]e are doing a lot at this agency. . . .[T]his decision is one step in a continuum of decisions to improve the reliability and public safety efficiency of these wireless phones." Chairman Kennard, Statement from Commission Open Meeting on May 13, 1999, regarding Stronger Signal E911 decision.
- In contrast, a Bureau grant of the pending waiver requests would be a giant leap backwards. It would contradict the Commission's previous determination not to extend the Phase II deadline to benefit a particular technology. It would dangerously undermine the public interest since handset-based technologies offer no accuracy improvements over network solutions and are at least several years from readiness.

**The Premise Underlying the Pending Waiver Requests is Flawed:  
GPS-Based Solutions Do Not Work and Are Still At Least Several Years Away**

SnapTrack recently claimed great success in a series of tests conducted in Tampa with the CDMA Development Group. Its press releases imply that GPS integration into handsets is complete or nearly complete and that the tests performed nearly flawlessly from an accuracy and yield perspective (yield being the percentage of time that the handset was actually able to calculate location). Integrated Data Communications (IDC) has proclaimed similar successes regarding a test conducted in Seattle. More recently, however, additional details have been revealed that confirm that it will be at least two years before anyone can determine whether handset/GPS solutions can meet even the waiver proponents' 90-meter accuracy proposals, let alone SnapTrack's and others' more lofty projections.

**SnapTrack Test in Tampa**

The SnapTrack Enhanced GPS (EGPS) system is a modified version of a GPS receiver that divides the GPS functionality in two: one-half of the GPS receiver is in the telephone (or other remote unit), and the other half is in a fixed location (eventually the CMRS network). But the Tampa test did nothing to prove that an integrated handset/GPS unit will work, even though SnapTrack has been developing its GPS solution for about five years now. The following information has been learned from public presentations and comments at (i) a European Commission conference on location technologies in Brussels on May 4-5 and (ii) a CDMA Development Group meeting in Baltimore on May 4-5.

**Test Results**

- The phone unit used in the test had a standalone SnapTrack GPS circuit module literally “glued” to its back. There apparently was no attempt at any hardware or software integration. The glued circuit board then used a permanent data connection to a SnapTrack data server. Therefore, “calls” were not being made and no voice communication was possible. Rather, the unit was continuously in communication with the SnapTrack data

server, which would repeatedly attempt to determine locations approximately every 30 seconds. This contrived set-up is not analogous to actual 9-1-1 call situations.

- The time required by the test unit to acquire the satellite signals frequently reached 20 to 25 seconds, and averaged 13 to 18 seconds. If the time reached 30 seconds, the process aborted and the location attempt failed. The rate of successful location attempts was frequently only in the 85% range (*i.e.*, as much as 15% of location attempts produced no data).
- Such performance is unacceptable when lives hang in the balance. As Commissioner Ness recently stated, "I know an awful lot of folks in this room would be very concerned if it took the full 20 seconds [to set up a 9-1-1 call] and even though this may be very, very rare, nonetheless you wouldn't want the odds to catch to you in an emergency situation." Statement of Commissioner Ness from Open Commission Meeting on May 13, 1999, regarding Stronger Signal E911 decision.
- At the CDMA Development Group meeting, SnapTrack presented accuracy results. The accuracy results ranged from very accurate in easy open sky conditions to 200 meters in more difficult conditions. The yield rate ranged from 100% in the best open sky conditions to a low of 20% in building interior conditions. SnapTrack provided no answers to questions about battery drain.

#### Subsequent Effect of Integrating the GPS Circuitry Into the Handset

- Motorola has experimented with small patch antennas *inside* of the case. Motorola claims that this smaller antenna loses about 8 dB from the "hockey puck" antenna used by SnapTrack in earlier trials. This is consistent with two papers submitted to the T1P1.5 standards group last summer by Motorola (T1P1.5/98-348) and Ericsson (T1P1.5/98-397).
- Motorola concluded "that GPS antenna handset integration will lead to significant performance loss as compared to external antennas used for prototype systems. These losses are likely to be on the order of

the sensitivity gains reported based on enhanced processing of the GPS signal. At best, an integrated GPS handset solution (with sensitivity enhancement) would perform only 6 dB better than an unenhanced unit with an external antenna. The more likely situation is essential parity or even a loss. Thus, this work calls into question claims of reliable location coverage for in building and in vehicle situations. In fact, outdoor coverage may also be degraded.”

- Ericsson concluded: “we agree with Motorola’s conclusion that integration of the GPS antenna into the handset will degrade the performance of the GPS receiver in the handset. The study supports Ericsson’s position that Assisted-GPS is not necessarily a good standalone method for positioning of users in a cellular network, but instead is a complement to other methods such as E-OTD or Uplink-TOA.”

#### Inability to Deliver Location Data to the PSAP

- SnapTrack acknowledged at the Baltimore CDMA Development Group meeting that it has no means to provide location data within the time frame required to route a 9-1-1 call to the appropriate PSAP.
  - The required time frame is within 2 to 4 seconds of a subscriber dialing “9-1-1 SEND.” SnapTrack requires that the voice call be established (which takes about 2 to 3 seconds) before it can begin sending the location data.
  - SnapTrack assumes that the 9-1-1 call will initially be routed based upon Phase I information and that the GPS location data may arrive after the PSAP answers the call. There are two problems with this assumption. First, routing based upon cell site (Phase I) is not as accurate as Phase II. Second, there are no standards for data paths to the PSAP terminal *after* the call has been answered. Data must be sent simultaneously with the start of the call or the PSAP cannot receive it.

Even if These and Other Problems Can Be Solved, Bringing an EGPS Handset to Market Will Take Several Years

- SnapTrack acknowledged during the Tampa test that a significant amount of standards work must be completed before real handset/GPS integration can be completed.
  - SnapTrack is not the only integrated handset/GPS proposal on the table. IDC, SiRF, Ericsson, Nokia, Lucent, Tandler, and possibly others have different types of proposed handset/GPS solutions. These proposals are not all compatible, and the standards bodies have not yet resolved the support issues required for universal support of these different types of handsets in the different wireless networks. Brand new compatibility, support, and roaming issues will be created by any decision to move to handset-based solutions.
- Carriers cannot place orders until the standards are resolved and integrated. GPS handsets will not be commercially available until at least 2 years after orders are placed.
  - Motorola publicly noted at the Brussels conference that it was only Motorola's semiconductor group that has announced a licensing arrangement with SnapTrack, and it is not a foregone conclusion that the handset group will conclude a deal. Motorola also stated that its semiconductor group needs at least 18 to 24 months to complete chipset integration – and only *then* can the handset integration can be completed.
  - Representatives of other major phone manufacturers have stated that it would take at least 24 months from the date they receive an order before GPS-equipped phones could be available, and they have received no orders to date.

### There are Other Functionality Barriers to SnapTrack's Success

- *There is no EGPS application for the 55 million analog handsets or for non-CDMA digital handsets.*
  - Since the SnapTrack EGPS solution is a hybrid network/handset-based solution, it also requires changes to the wireless network. But EGPS currently can work only with CDMA base stations, not with analog, TDMA or GSM base stations. SnapTrack stated at an IEEE conference in Dallas in early April that only CDMA base stations have the GPS timing units required to provide accurate time to the network-assist part of its EGPS solution.
- A wireless phone with the SnapTrack GPS receiver must “blank out”, or shut off, the cellular antenna while receiving the GPS signal to avoid interference in the GPS receiver caused by the wireless system transmissions. In the Tampa test, the cellular antenna was shut off for up to 2 seconds; the oscillator used in the GPS receiver then required an additional 2 seconds to “settle down” in order to make an accurate measurement.
- There are three conclusions to draw from this: (i) SnapTrack may never be able to provide location data to the PSAP within the time frame required for 9-1-1 call routing; (ii) SnapTrack may never be able to provide continuous tracking for 9-1-1 calls because of the need to repeatedly shut off the CMRS antenna; and (iii) there is a risk that the phone will drop the 9-1-1 call when the antenna is shut off and then attempts to turn back on again.

### IDC Test in Seattle

Although IDC's proposed system would not necessitate the granting of Phase II waivers because it purportedly will be deployed through replacement batteries for existing phones, the IDC test in Seattle was also somewhat contrived. This again illustrates that GPS-based E911 solutions are not yet workable.

- Like SnapTrack's EGPS system, the IDC solution also requires that the voice channel be established *before* the GPS data can be sent. This means that the call must first be answered at the correct PSAP so that IDC can then send the location information. The test conducted in Seattle was carefully planned so that the cell sites in the test area all routed to the same PSAP.
- IDC's time to determine location may be unacceptably long in a great many cases.
  - IDC does not make GPS receivers – it actually uses the SiRF chipset. IDC has developed only a protocol that sends the GPS data over the voice channel using tones. SiRF's own product literature indicates that the chipset has a cold start of up to 1 minute, a warm start of up to 40 seconds, and a hot start of up to 8 seconds. IDC's time to determine location cannot be better than that claimed by the manufacturer of the chipset that it uses.



### Handset-Based Solutions are *Not* Less Expensive Than Network Solutions

- SnapTrack's cost estimate for integrated handset/GPS is \$17 per phone: \$10 of new parts in the phone plus \$7 licensing fee to SnapTrack. (Phone manufacturers have not confirmed that the costs are that low; nor have they indicated what their own mark-ups would be.) Even assuming churn rates are as high as 30%, as some waiver proponents contend, this implies that the average life of a phone is 40 months. If so, the most optimistic estimate of phone cost alone is \$17 over 40 months, or 42.5 cents per subscriber per month.
  - The SnapTrack system will also have significant distribution, network deployment, and operating costs, but SnapTrack has never disclosed these costs.
- In contrast, TruePosition's full service bureau system price (not just the cost) averages approximately 75 cents per subscriber per month. The full service bureau includes 5 to 7 years of operations personnel and field service. This also provides a system that meets the Phase II requirements of locating all phones and providing location within 2 to 4 seconds of a wireless 9-1-1 call attempt.
  - Without a full service bureau, the product price alone would be approximately 40 cents per subscriber per month – less than SnapTrack's optimistic handset cost estimates that ignore associated network and operating costs.
  - To truly compare "apples to apples," if TruePosition were to reduce its functionality to that similarly being projected by SnapTrack for October 2001 (*i.e.*, so that location was not provided until 10 or more seconds after the start of the 9-1-1 call and location was provided only for a limited proportion of mobile phones), TruePosition's system could be delivered at a price as low as 25 cents per subscriber per month.

### The Record Does Not Justify Granting the Pending Waiver Requests

- None of the waiver requests demonstrate any technical or economic infeasibility that would justify a waiver of the Phase II ALI rules or any modification of the nearly three year-old obligation to implement Phase II ALI technology by October 1, 2001.
- Moreover, the waiver requests fail to satisfy the December 24, 1998 Waiver Notice's requirement of demonstrating the viability of handset-based E911 solutions. Specifically, the Bureau listed three critical factors that must be met to justify any waiver:
  - **Accuracy:** Carriers must commit to providing a significantly higher level of accuracy than would otherwise be available.
    - There is no evidence that handset-based E911 technologies will be able to provide greater accuracy than that already provided by network-based systems. Waiver proponents merely offer unsubstantiated claims about “potential” benefits of handset-based technologies, but these fail even to exceed the present capabilities of network-based, Phase II-compliant technologies.
  - **Early Implementation:** Carriers must begin implementation of ALI capabilities before the October 1, 2001 deadline.
    - It is very doubtful that *any* GPS-capable phones could be deployed by the current Phase II deadline, and even less likely that all such phones would be manufactured to a uniform GPS standard. Since handset-based solutions are commercially available now, a grant of the waivers would unnecessarily delay the universal deployment of E911 technology to over 100 million CMRS users for an undetermined time period.

- **Addressing the Roamer Problem:** Carriers must demonstrate how they can overcome the roamer problem inherent in handset-based solutions.
- Waiver proponents offer no solution. They simply rely on the backstop of Phase I technologies, network-based systems, and unrealistic churn rates to solve the roamer problem.